

WHAT IS CLAIMED IS:

- 1           1.       A power source comprising:  
2           at least one non-radioactive power source; and  
3           at least one radioactive power source in electrical communication with said at  
4 least one non-radioactive power source, said at least one radioactive power source  
5 comprising:  
6                   at least one junction of a first material and a second material, wherein said  
7           first material has a first electrochemical potential and said second material has a  
8           second electrochemical potential, wherein said first and second electrochemical  
9           potentials are different; and  
10           at least one radiation source.
- 1           2.       The power source of claim 1, wherein said at least one radioactive power  
2 source maintains a charge associated with said at least one non-radioactive power source.
- 1           3.       The power source of claim 1, further comprising a power conditioning  
2 circuit interposed between and in electrical communication with said at least one non-  
3 radioactive power source and said at least one radioactive power source.
- 1           4.       The power source of claim 3, said power conditioning circuit further  
2 comprising a power management circuit.
- 1           5.       The power source of claim 1, further comprising a pair of power source  
2 outputs and a power conditioning circuit, said power conditioning circuit interposed  
3 between and in electrical communication with said at least one non-radioactive power  
4 source and said pair of power source outputs.
- 1           6.       The power source of claim 1, wherein said at least one junction is selected  
2 from the group consisting of homo-junctions and hetero-junctions.
- 1           7.       The power source of claim 1, wherein said at least one junction is a metal-  
2 oxide-semiconductor structure.

1           8.       The power source of claim 1, wherein said at least one radioactive power  
2 source is a beta cell.

1           9.       The power source of claim 8, wherein said beta cell is comprised of an  
2 icosahedral boride semiconductor.

1           10.      The power source of claim 1, wherein said at least one non-radioactive  
2 power source is selected from the group consisting of zinc-carbon batteries, zinc-chloride  
3 batteries, magnesium batteries, aluminum batteries, alkaline-manganese dioxide batteries,  
4 mercuric oxide batteries, silver oxide batteries, zinc-air batteries, lithium batteries, solid-  
5 electrolyte batteries, magnesium water-activated batteries, zinc/silver oxide batteries,  
6 thermal batteries, lead-acid batteries, iron electrode batteries, nickel-cadmium batteries,  
7 nickel-metal hydride batteries, nickel-zinc batteries, nickel-hydrogen batteries, silver  
8 oxide batteries, rechargeable lithium and lithium-ion batteries, rechargeable  
9 zinc/alkaline/manganese dioxide batteries, metal-air batteries, zinc/bromine batteries,  
10 sodium-beta batteries and lithium/iron sulfide batteries.

1           11.      The power source of claim 1, wherein said at least one non-radioactive  
2 power source is a capacitor selected from the group consisting of metal-oxide-  
3 semiconductor (MOS) capacitors, metal-dielectric-metal capacitors, and semiconductor-  
4 dielectric-semiconductor capacitors.

1           12.      The power source of claim 1, wherein said at least one non-radioactive  
2 power source is a fuel cell.

1           13.      The power source of claim 12, wherein said fuel cell is selected from the  
2 group consisting of hydrogen-oxygen fuel cells, metal hydride fuel cells, chemical  
3 hydride fuel cells, and methanol fuel cells.

1           14.      A semiconductor package comprising:  
2 a package substrate;  
3 a plurality of pins attached to said substrate;  
4 a plurality of package leads in electrical communication with said plurality of  
5 pins;

6 at least one non-radioactive power source mounted to said semiconductor  
7 package; and  
8 at least one radioactive power source mounted to said semiconductor package and  
9 in electrical communication with said at least one non-radioactive power source, said at  
10 least one radioactive power source comprising:  
11 at least one junction of a first material and a second material, wherein said  
12 first material has a first electrochemical potential and said second material has a  
13 second electrochemical potential, wherein said first and second electrochemical  
14 potentials are different; and  
15 at least one radiation source.

1 15. The semiconductor package of claim 14, further comprising an IC  
2 mounted to said package substrate and in electrical communication with said plurality of  
3 package leads.

1 16. The semiconductor package of claim 14, further comprising a power  
2 conditioning circuit interposed between and in electrical communication with said at least  
3 one non-radioactive power source and said at least one radioactive power source.

1 17. The semiconductor package of claim 16, said power conditioning circuit  
2 further comprising a power management circuit.

1 18. The semiconductor package of claim 14, further comprising a pair of  
2 power source outputs and a power conditioning circuit, said power conditioning circuit  
3 interposed between and in electrical communication with said at least one non-radioactive  
4 power source and said pair of power source outputs.

1 19. The semiconductor package of claim 14, wherein said at least one  
2 radioactive power source is a beta cell.

1 20. The semiconductor package of claim 19, wherein said beta cell is  
2 comprised of an icosahedral boride semiconductor.

1 21. The semiconductor package of claim 14, wherein said at least one non-  
2 radioactive power source is selected from the group consisting of zinc-carbon batteries,  
3 zinc-chloride batteries, magnesium batteries, aluminum batteries, alkaline-manganese

4 dioxide batteries, mercuric oxide batteries, silver oxide batteries, zinc-air batteries,  
5 lithium batteries, solid-electrolyte batteries, magnesium water-activated batteries,  
6 zinc/silver oxide batteries, thermal batteries, lead-acid batteries, iron electrode batteries,  
7 nickel-cadmium batteries, nickel-metal hydride batteries, nickel-zinc batteries, nickel-  
8 hydrogen batteries, silver oxide batteries, rechargeable lithium and lithium-ion batteries,  
9 rechargeable zinc/alkaline/manganese dioxide batteries, metal-air batteries, zinc/bromine  
10 batteries, sodium-beta batteries and lithium/iron sulfide batteries.

1           22.     The semiconductor package of claim 14, wherein said at least one non-  
2 radioactive power source is a capacitor selected from the group consisting of metal-oxide-  
3 semiconductor (MOS) capacitors, metal-dielectric-metal capacitors, and semiconductor-  
4 dielectric-semiconductor capacitors.

1           23.     The semiconductor package of claim 14, wherein said at least one non-  
2 radioactive power source is a fuel cell.

1           24.     The semiconductor package of claim 23, wherein said fuel cell is selected  
2 from the group consisting of hydrogen-oxygen fuel cells, metal hydride fuel cells,  
3 chemical hydride fuel cells, and methanol fuel cells.

1           25.     The semiconductor package of claim 14, wherein said semiconductor  
2 package is selected from the group consisting of DIPs, PQFPs, SIPs, ceramic flatpacks,  
3 PIN packages, SOIC packages, QSOPs, LCC packages, and PLCCs.

1           26.     The semiconductor package of claim 15, further comprising a substrate,  
2 wherein said IC and said at least one radiation power source are each fabricated on said  
3 substrate.

1           27.     The semiconductor package of claim 14, further comprising a radiation  
2 shield substantially containing said at least one radiation power source.